

Medical Control Guideline: AIRWAY MANAGEMENT AND MONITORING

DEFINITIONS:

Advanced Airway Maneuvers: Use of a cuffed endotracheal tube or King LTS-D to facilitate ventilation and/or oxygenation in a patient who is unable to protect his/her own airway or maintain spontaneous respiration.

Basic Airway Maneuvers: Manual airway positioning, obstructed airway maneuvers, bag-mask-ventilation (BMV), and/or use of airway adjuncts (nasopharyngeal or oropharyngeal airways) to provide ventilation and/or to facilitate oxygenation in a patient who is unable to maintain adequate spontaneous ventilation.

Hypoxia: Lower than normal oxygen (O_2) concentration in the blood resulting in diminished availability of O_2 to the body tissues.

Hyperoxia: Exposure of cells, tissues and organs to an excess supply of oxygen.

Hypoventilation: Ventilation that is inadequate to support gas exchange in the lung.

Manageable Airway: Ventilation is effective, such that one of the following holds true:

- a. Patient is breathing adequately through a patent airway.
- b. Patient is mechanically ventilated effectively via bag-mask-ventilation (BMV), King LTS-D or endotracheal tube (ET).

Unmanageable Airway: The patient is not able to breathe adequately and EMS personnel are not able to maintain the patient's airway and/or cannot ventilate the patient effectively via BMV, King LTS-D or ET.

Unprotected Airway: The patient is not able to protect his/her airway from the risk of aspiration and is not being ventilated via a cuffed ET in the trachea. Ventilation may be effective with BMV or with insertion of a King LTS-D, but the airway is not fully protected from risk of aspiration.

PRINCIPLES:

1. Signs and symptoms of hypoxia may include O_2 saturation (SpO_2) $< 94\%$ with respiratory distress, altered mental status or changes in skin signs.
2. Providing O_2 to emergency medical services (EMS) patients may be a lifesaving procedure. Both hypoxia and hyperoxia are potentially harmful; therefore, O_2 should be treated like any other drug and administered when indicated.
3. Hypoventilation results in high arterial carbon dioxide (CO_2). In general, this results in an end-tidal $CO_2 > 45\text{mmHg}$ on capnography, but end-tidal CO_2 may not reflect arterial CO_2 when lung disease and/or increased dead space are present.
4. Basic airway maneuvers should be performed prior to advanced airway maneuvers on patients with hypoventilation.

5. Techniques and procedures utilized for airway management may vary based on operational environment, patient condition and the EMS personnel's level of training and expertise.
6. Patients with unmanageable airway shall be transported to the most accessible receiving facility.
7. Advanced airway tube placement must be verified and continually monitored.
 - a. In Los Angeles County, Endotracheal intubation (ETI) is considered a definitive airway.
 - b. King LTS-D tubes may not protect the patient from aspiration. It is recommended that this be used when prehospital personnel are unable to secure a definitive airway (ETI) or when patient's medical condition or anatomy predicts likely failure of ETI.
8. Pulse oximetry and capnography are essential tools for monitoring the effectiveness of airway management. While pulse oximetry monitors oxygenation, it does not assess adequacy of ventilation. Capnography is necessary to monitor ventilation. Capnography is most accurate with proper two-person BMV technique or advanced airway.

GUIDELINES:

1. If pulse oximetry is not available (BLS Unit) and the patient is in mild or moderate respiratory distress, provide O₂ with nasal cannula at 2-6 liters per minute.
2. When available, use pulse oximetry to guide oxygen therapy. The desired SpO₂ for most non-critical patients is 94-98%. Document pulse oximetry reading.
3. Initiate immediate high-flow O₂ (15 L/min) for the following conditions:
 - a. Respiratory Arrest
 - b. Cardiac Arrest
 - c. Shock/Poor Perfusion
 - d. Anaphylaxis
 - e. Traumatic Brain Injury
 - f. Carbon Monoxide Exposure
 - g. Suspected Pneumothorax
 - h. Hypoxia <94% not corrected with nasal cannula or simple mask
4. If high-flow O₂ is indicated, use one of the following O₂ delivery system based on the patient's condition:
 - a. Non-rebreather mask
 - b. BMV with reservoir
 - c. Endotracheal tube
 - d. King LTS-D airway
 - e. CPAP per [MCG 1315](#)
5. For stable patients with mild hypoxia (SpO₂ less than 94%), start O₂ with nasal cannula at 2-6 L/min or basic mask at 8-10 L/min. If patient is unable to tolerate nasal cannula or basic mask, use blow-by technique with O₂ flowing at 15 L/min.
6. Consider the following special populations when titrating oxygen therapy:
 - a. Chronic Obstructive Pulmonary Disease (COPD) – goal SpO₂ is 88 – 92%

- b. Newborns in need of positive-pressure ventilation – ventilate for 90 seconds with room air, if heart rate remains less than 100 beats per minute, start O₂ at 15 L/min
 - c. Pediatric Congenital Heart Disease – use O₂ with caution if known history of low baseline O₂ saturation
7. Continue to monitor SpO₂ and titrate O₂ therapy as appropriate for the patient's clinical condition until transfer of patient care.
 8. Document the SpO₂, O₂ delivery system used, and the liters per minute administered.
 9. If suctioning is required, pre-oxygenate prior to suctioning and do not suction longer than 10 seconds per occurrence. For tracheal suctioning, maintain sterile procedures.
 10. Considerations for oropharyngeal airway:
 - a. Unresponsive patient requiring BMV – should be utilized in all such patients where gag reflex is absent
 - b. In pediatric patients, placement may not be necessary to achieve adequate ventilation
 11. Considerations for nasopharyngeal airway:
 - a. Spontaneously breathing patients who require assistance in maintaining a patent airway (e.g., seizure patient, intoxication)
 - b. Unresponsive patients requiring BMV in whom an oropharyngeal airway cannot be inserted
 12. Considerations for BMV:
 - a. Apnea or agonal respirations
 - b. Altered level of consciousness with hypoventilation or hypoxia despite maximal supplemental O₂
 13. Considerations for endotracheal intubation:
Adults or Pediatrics 12 years or greater, or longer than the length-based resuscitation tape (e.g., Broselow Tape™)
 - a. Ineffective ventilation with BMV
 - b. Prolonged transport time
 - c. Unprotected airway
 14. Considerations for rescue airway (King LTS-D):
Adults or Pediatrics longer than the length-based resuscitation tape (e.g., Broselow Tape™)
 - a. Unsuccessful attempts (maximum three attempts) at endotracheal intubation (with or without the use of a flexible introducer guide)
 - b. Suspected difficult airway based on assessment and anatomical features

Height	Size	Air
Between 4 feet to 5 feet	3	40-55mL
Between 5 feet to 6 feet	4	50-70mL
6 feet or greater	5	60-80mL

15. Considerations for stoma intubation:
Adult patients with obstruction unrelieved by suctioning and replacing inner cannula.
For pediatric patients, and for adult patients in which a new tube cannot be placed, utilize bag mask ventilation via mouth (while covering the stoma) or stoma (if no chest rise with mask over mouth).
16. Verify endotracheal tube or rescue airway placement utilizing capnography. In case of device failure, use an End-tidal CO₂ detector or an Esophageal Detector Device (EDD). Document the method used for placement verification.
17. Additional confirmation of endotracheal tube placement shall include **all** of the following:
 - a. Bilateral lung sounds
 - b. Bilateral chest rise
 - c. Absent gastric sounds
 - d. Pulse oximetry
18. Continuously assess ventilation status and monitor capnography for all patients requiring BMV or advanced airway placement. Report capnography reading to the base hospital and document capnography reading as follows:
 - a. Every five minutes during transport
 - b. After any patient movement
 - c. With any change in patient condition
 - d. Upon transfer of care
19. Sedation may be administered by paramedics as needed during transport of intubated patients. This sedation may only be administered after the patient is intubated and may not be administered to facilitate intubation.
Adult Dose:
Midazolam (5mg/mL) 5mg, may repeat in 5 min x1, maximum total dose prior to Base contact 10 mg
Pediatric Dose:
Midazolam (5mg/mL) 0.1mg/kg dose per [MCG 1309](#), may repeat in 5 min pm x1, maximum 2 doses prior to Base contact